



By the Numbers

A typical soil test can guide you in the type of aerification you should be doing to strike the right balance between air-filled and capillary porosity. by Jason Stahl

Many golf course superintendents believe that soil testing is the most critical element of course maintenance. Without it, you're really shooting in the dark as far as trying to figure out what your turfgrass needs to be healthy.

A soil test can tell you a lot of things, including what type of aerification you should be doing. And aerification has become even more important to do today with the new grasses being greater thatch producers than the old ones.

Of course, in today's economy, superintendents are being asked to

aerify less in order to minimize disruption and maximize the number of play days.

That aside, it's critical to understand the different types of soil tests out there that can shed light on what you should be doing aerification-wise: a physical soil test and a chemical soil test.

A physical soil test can give you the air-filled and capillary porosity of your soil, but also the organic content. Some labs that do mostly chemical tests also do organic content tests, too.

Sometimes it's an added analysis for an additional fee. But figuring

Key points

- It's critical to understand the different types of soil tests: a physical soil test and a chemical soil test.
- A physical soil test provides the air-filled and capillary porosity of the soil, as well as the organic content.
- Greens should have no more than 2 percent organic content, and native fairways should have from .5 to 3 percent.
- The more organic matter content you have, the more water holding capacity.
- A soil test won't spell out the tine size you should be using or how many times you should aerate.
- An accredited lab can offer information on the percentage of organic material in different layers and what the dilution rate is, or the percentage of sand versus organic material.

CULTIVATION

out a soil's organic content is relatively easy to do, so it's usually not that much more expensive, says Dara Park, assistant professor, turfgrass, soil and water quality at Clemson University.

"Sometimes organic matter content can tell you a lot, and sometimes you don't need to do a physical test just to get that data," says Park.

"You may already have it on your other soil test, so check there first. Doing a physical soil test is important, but you may not have to do it with the frequency you do a regular chemical soil test."

With that in mind, there are USGA standards as guidelines: greens should have no more than 2 percent organic content, and native fairways should have between .5

percent and 3 percent.

"There is that range there because it is a native fairway, so you may have a native soil that is sandy that could really benefit by having more organic content up towards that high end of three percent," Park says.

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– Dara Park, Clemson University

"Or you may have a clay soil, in which case you don't want a lot more organic matter because the more organic matter you have, the more water-holding capacity you'll have, and it's already a clay soil. Therefore, you may want to stay closer to .5."



Aerification has become even more important to do because new grasses are greater thatch producers than old ones.

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Choosing a Lab

Choose a lab you're happy with for your soil testing and stay with it. That's the advice Dara Park, assistant professor, turfgrass, soil and water quality at Clemson University, has for superintendents confused on what lab to choose for their soil test.

"Different labs have different procedures, so if you're working with one lab and they do a soil analysis for you following one procedure, and then you decide to switch labs to get another soil analysis, but in between that time you followed a rigorous control program and want to see how it's working, the numbers may not be relative to each other," says Park. "If you stick with one lab, even though those values may not be exactly correct, you can see how they change relative to each other."

Park uses an example: if you did a soil test with one lab and found an organic matter content of three, then followed a strong treatment program and used the same lab to do another soil test the following year and got a two, you would know what you're doing is working. If you had switched labs, you very well might have gotten a three because of the different methods it was following.

"Some methods are very detailed, and the value takes into consideration not only the method but also the lab tech performing the analysis," Park says. "Everyone is a little different. It's not so much of a problem for physical properties as it is for chemical properties, but it does happen. So stick with the same lab."

Another thing to keep in mind is that many labs have contract pricing, so if you sign a contract for X amount of samples per year, you get a certain price.

Bud White, director of the USGA's Mid-Continent Region, suggests checking out the USGA's website to see a list of accredited labs.

"As long as the lab is accredited and tests for USGA specs and chooses proper ASTM standards, you'll get good results," White says.

A chemical test will show whether you need to do more aeration and venting or not.

There are standards for air-filled porosity, capillary porosity, water-holding capacity and saturated hydraulic conductivity (KSAT), as well. And the KSAT seems to be the one that superintendents want to make sure their soil is hitting, says Park.

"It's always in inches per hour, and it's at least six for a USGA standard green," she says. "Because fairways aren't as important as putting surfaces, they can be lower, so the threshold value is two inches per hour. But superintendents need to keep in mind that the more organic matter content you have, the more water holding capacity you'll have."

The first number Park advises to look at is organic content, which you can typically get on a regular soil test, which means you don't have to do a physical soil test. If it's a little high, you should probably do a physical test, which will confirm it's high and indicate what it's doing to your water-holding capacity, porosity, KSAT, etc.

What a soil test won't do is spell out the tine size you should be using and how many times you should aerate. There are some popular recommendations in the industry, but it depends on the resources available to you.

Some superintendents have started to

buy aeration equipment together and share it so they can have a greater variety of equipment at their disposal: solid tine, hollow tine, bayonet, different spacing, diameter, depth, etc.

Speaking of depth, it's not a bad idea to take soil samples at different depths. For example, if you've been going down four inches for years and want your roots to go deeper, you could take two soil cores, one from a four-inch depth and one from four to eight inches.

"You will be able to see how much organic matter is in that lower depth and look at the physical properties and see if they're not conducive to root growth," says Park. "If not, then you'll know you need to get a longer tine in there."

Golf course turf is so intensely managed that Park feels any course would benefit from doing a soil test at least on an annual basis.

Superintendents new to a course should take soil cores right away and send them out for physical and chemical analyses. But once you have a good program going and know your soils, you may not have to take samples as often.



Watch it

Check out these informative online videos from Harrell's for more information about soil testing and interpreting their results. Enter the following urls into your browser to watch these videos.

Golf course soil testing with Dr. Snyder
youtu.be/U-nCCxjomIE

Interpreting soil test results for turf
youtu.be/EwhHuPIFnVQ

Bud White, director of the USGA's Mid-Continent Region, believes the only value a chemical test would have in giving superintendents information on aeration is indicating the salinity of the soil.

"If it shows that you have higher salts than you should, that would tell you that you need to do more aeration and venting so you could flush better," he says.

A physical test, White says, is really the most telling when it comes to aeration. Sending in an undisturbed core to an accredited lab will offer information on the percentage of organic material in different layers and what the dilution rate is, or the percentage of sand versus organic material.

"It's important to keep that dilution up with sand where you're building organic matter in the rootzone so that the rootzone stays porous to air and water movement," says White.

"When that upper portion becomes more organic than sand, it seals off the top of the rootzone and creates a false perched water table, which ruins the air and water movement into the soil."

After the test results are back, it's up to the superintendent to determine a course of action, whether that be doing more aeration and topdressing (which go hand-in-hand for the dilution) or nothing at all – because the results indicate that their current program is doing a good job of keeping air-filled porosity up and capillary porosity down.

White says some superintendents test their soils annually, but believes that most can get by doing it once every two years.

"You sure don't need to do it more than once a year," White says. "If I had salt in my irrigation water, I would be testing my greens twice a year because of the tendency to leach nutrients." **GCI**

Jason Stahl is a Cleveland-based writer and frequent GCI contributor.



For more...

Check out the August 2012 USGA Green Section article "Don't Guess - Check the Numbers!" about how soil testing reports can impact your

aerification practices. Enter bit.ly/16DHVxi into your browser to access this article.



PHOTO: MIKA MICHAYKA, CLEVELAND UNIVERSITY



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Above left: What turf looks like when rolling has been completed. Above right: A side-by-side comparison of turf before and after it has been vented.



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